



Clinical and Radiological Outcome of Varus Derotation Osteotomy in Herrings Group B, B/C and C of Perthes Disease

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Abstract

Background: Children between the age of group of 3 years and 12 years are affected with a self-limiting avascular necrosis of the femoral head resulting in deformity of the femoral head and secondary osteoarthritic changes. The principle aim of treatment is to contain the femoral head in the acetabulum to prevent the deformation. Varus derotation osteotomy has been advocated by many for severe cases for increasing the femoral head coverage by varus angulation and correction of the rotation. This study was done to evaluate the clinical and radiological outcome of varus derotation osteotomy in children aged 6 to 8 years with herrings group B, group B/C and group C perthes disease.

Materials and methods: A prospective study of children affected with herrings lateral pillar classification group B, group B/C and group C of

perthes disease within the age group of 6 to 8 with a containable head and pre-op abduction more than 30 degree who underwent varus derotation osteotomy from august 2010 to November 2012 done by a single surgeon were selected for study. Clinical parameters such as wound condition, function on Catterall post-operative classification, limb length discrepancy, limping, range of movement and trendlenburg sign were assed and radiological parameters such as Mose index, Sjovalls Epiphyseal quotient and center edge angle of Wiberg were measured and analyzed by students T test for significance.

Results: There was a significant improvement in the functional and radiological outcome after varus derotation osteotomy in herrings group B and C category shown by statistically significant relation between the herrings group B and C with Catterall Classification, Mose index, epiphyseal quotient and

center edge angle of Wiberg. Age Gender were not statistically significant in determining the functional outcome in our study

Conclusion: Varus derotation osteotomy is a simple and effective method of containment of femoral head in herrings stage B and C with increased clinical and radiological outcome if done in children aged 6 to 9 years. Herrings lateral pillar classification was found to be a good prognostic indicator to predict outcome after varus derotation osteotomy.

Keywords: Varus derotation osteotomy, Perthes Disease, Femoral head containment, Herrings lateral pillar classification.

Introduction

Legg Calve Perthes disease is a self-limiting paediatric hip disorder characterized by avascular necrosis of femoral head followed by revascularization and remodeling. The common age group affected is 3-12 years with average age group of 7 years with male preponderance. Since the pathological process is self-limiting, revascularization occurs by creeping substitution & thereby new bone ossification starts. The principal aim of treatment of Perthes disease is to minimize the deformation of the femoral head, softened by the disease process, to prevent future development of degenerative changes and restore the normal range of hip motion. Containment of the femoral head within the concavity of the acetabulum decreases the mechanical load on the weight bearing area of the hip joint, thus protecting it against deformation and allowing the normal development of the femoral head and acetabulum. Though mild cases can be managed by conservative management (1,2) severe cases require surgical containment.

Varus derotation osteotomy (VDRO) is a popular method for the operative treatment of Perthes disease. It

has been shown by many authors to improve clinical and radiological outcomes in patients (3,4,5). Varus derotation osteotomy increases the coverage of the femoral head by varus angulation and correction of the rotation thereby reducing the forces acting on the weight bearing portion of the femoral head are redirected laterally and anteriorly which helps to control the lateral displacement by realigning the epiphyseal line.

This study was done to evaluate the clinical and radiological outcome of varus derotation osteotomy in children aged 6 to 8 years with Herrings group B, group B/C and group C perthes disease in a tertiary care hospital.

Material and Methods

A prospective study involving all children with Herrings Lateral pillar classification Group B, group B/C and group C of perthes disease aged between 6 to 8 years, who underwent varus derotation osteotomy, was done from August 2010 to November 2012 by a single surgeon. Children lost to follow-up, those with bilateral perthes, restricted range of movements of hip and those with hinged abduction were excluded from the study. There were 30 children who qualified for the inclusion criteria and they all had a containable head with a pre-operative abduction more than 30 degree.

The surgical technique includes a 10cm lateral longitudinal incision beginning at the tip of greater trochanter distally. Osteotomy done at the sub-trochanteric level with the extremity held in internal rotation using hand drill and osteotome. Angular correction done and a pre-bend 3.5mm DCP (7/8 hole with 3 screws proximal and distal) is used to fix the fragments to keep a target neck shaft angle of 100 to 110 degree. Epiphysiodesis done by drilling and directing the proximal screw through the physis. Skin

closed with staples over suction drain. Drain removed after 24hrs and sutures removed on 10th post op day.

All children were advised non weight bearing mobilization for 6-8 weeks followed by partial weight bearing for 8 to 10 weeks and full weight bearing by 12 weeks with regular follow-up up at 3 months, 6 months, 9 months and 18 months (average) when implant removal was done.

Clinical parameters such as wound condition, function on Catterall post-operative classification, limb length discrepancy, limping, range of movement and trendlenburg sign were assed and radiological parameters such as Mose index, Sjovalls Epiphyseal quotient and center edge angle of Wiberg were measured and analyzed by students T test for significance using SPSS 15.0 software

Results

Out of the 30 children there were 25 males and 5 females. Age wise distribution showed ten were of age 6, seventeen were of age 7 and three were of age 8. There was no statistically significant difference in age and gender to the clinical or radiological outcome after varus derotation osteotomy.

Nineteen children belonged to Herrings group B and 11 belonged to group C with non in group B/C. The relationship between the herring’s classification and clinical outcome (Catterall’s post -operative classification) is done using chi square test and was statistically significant. Hence varus derotation osteotomy improved functional outcome ranging from good to fair in Herrings.

			Clinical Outcome			Total
			Good	Fair	Poor	
Herrings	B	Count	17	2	0	19
		% within Herrings	89.5%	10.5%	0%	100%
	C	Count	1	8	2	11
		% within Herring	9.1%	72.7%	18.2%	100%
Total		Count	18	10	2	30
		% within Herring	60%	33.3%	6.7%	100%

The relationship of herrings group with mose index were also studied and found that herring B group had good to fair outcome and fair to poor outcome in group C which was statistically significant using chi square test.

			Mose Index			Total
			Good	Fair	Poor	
Herri ngs	B	Count	5	14	0	19
		% within Herrings	26.3%	73.7%	0%	100%
	C	Count	0	4	7	11
		% within Herring	0%	36.4%	63.6%	100%
Total		Count	5	18	7	30
		% within Herring	16.7%	60.0%	23.3%	100%

The relationship between herring’s group and epiphyseal quotient showed good to fair results with herrings group B and fair to poor with herrings group C which was also statistically significant using chi square test.

			Epiphyseal quotient			Total
			Good	Fair	Poor	
Herrings	B	Count	12	7	0	19
		% within Herrings	63.2%	36.8%	0%	100%
	C	Count	0	5	6	11
		% within Herring	0	45.5%	54.5%	100%
Total		Count	12	12	6	30
		% within Herring	40%	40%	20%	100%

The relationship between herrings group and centre edge angle of Wiberg showed good to fair results with herrings b and fair to poor in herrings C which shows that it is a good procedure to attain containment in the children in the stage of fragmentation.

			CE Angle of Wiberg			Total
			Good	Fair	Poor	
Herrings	B	Count	18	1	0	19
		% within Herrings	94.7%	5.3%	0%	100%
	C	Count	0	10	1	11
		% within Herring	0%	90.9%	9.1%	100%
Total		Count	18	11	1	30
		% within Herring	60	36.7%	3.3%	100%

This shows that varus derotation osteotomy gives good to fair clinical and radiological results when done early in the course of the disease and in herrings group B. This study also gave consistent results with various parameters assessed suggesting that herrings classification is a good prognostic indicator to predict the outcome after varus derotation osteotomy.

Two children had post-operative superficial wound infection which was managed with parenteral antibiotics. Twenty-two children had hypertrophied scar, but no active intervention was done except for local steroid application. The average shortening was 0.96cm which all children tolerated without any further interventions. Nine children had limping which was conservatively managed with reassurance that it will improve with time. There was no non-union at the osteotomy site or failure of implant in our study series.

Discussion

Since the introduction of varus derotation osteotomy in 1965, its use has been emphasized by many investigators (6,7,8). Varus derotation osteotomy increases the coverage of the femoral head by varus angulation and correction of the rotation. Study done by GC Lloyd-Roberts et al⁶ concluded that varus derotation osteotomy is the treatment of choice for containment in Catterall stage II, III, IV with head at risk signs. Though we used herrings group B and group C, it gave similar results. E V Somerville (9) in another study suggested reduction in treatment time by varus derotation osteotomy. A study conducted by Raghav

Sainiet al (10) in 2009 had suggested varus derotation osteotomy as an effective and easy surgical containment method for children with severe Perthes disease, especially who are younger than 10 years of age. Similar results have also been reported by Heikkinen E & Puranen J (4), and Hoikkaet al (5). Our study also had similar results but no relationship with age was established in our study, which may be attributed to narrow range of age considered for the study. We had 93% good to fair results which may be attributed to the strict patient selection criteria, but relative smaller sample size and shorter follow-up is a demerit to our study.

Many authors have shown that there are no long-term benefits between other complex osteotomies and varus derotation osteotomies even though it is a technically simple procedure with no additional risk to nearby neurovascular structures resulting in its wide applicability. The major complication that has been reported from literature is shortening, but this can be minimized if a medial open wedge technique is used like in our study. None of the patients had non-union of the osteotomy site or any of these went in for failure.

Conclusion

Varus derotation osteotomy is a simple, effective and reproducible method for containment of femoral head for patients belonging to the Waldenstrom's fragmentation stage (Herrings Group B & C) in the age group 6 to 9 years with better results in group B and if done early in the course of disease. Our study also found that herrings lateral pillar classification is a good prognostic indicator to predict the outcome after varus derotation osteotomy. Most frequent complication seen in our study was hypertrophic scar with shortening which is well tolerated. Although gender did not influence the outcome in this age group (6 to 9 yrs.) a

wider age group with long term of follow-up, at least up to skeletal maturity is required to prove the exact outcome after varus derotation osteotomy.

Hence, we conclude that the results of varus derotation osteotomy are favourably encouraging with definite advantage of reproducibility and high patient compliance in the stage of fragmentation for children aged between 6 to 9 years.

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